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ABSTRACT

Research examined the hypothesis that predictive validity would be greater for a test given under stress instructions than for a test given under relax instructions. Ss were 254 education students in a graduate measurement course and 117 education students in an undergraduate measurement course. Ss were randomly assigned to the instructional conditions. For the graduate and undergraduate data separately, a Pearson r was computed between pretest and final exam scores for each treatment group. On both graduate and undergraduate levels, the difference between the r's was significant (p .=) in the predicted direction, suggesting the usefulness of a stress dimension for enhancing predictability. (Author)

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EFFECT OF DIFFERENTIALLY MOTIVATING INSTRUCTIONS ON THE PREDICTIVE VALIDITY OF A TEST DEVICE

by

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Problem

For a number of years, psychological research has been pointing up the need for viewing learning and performance not only as a function of the material but also as a function of how different individuals respond to the material. As an implication of this view within the context of an academic test setting, test performance may be held to be a product not only of cognitive factors but also of personality factors operating within the individual.

Considering stress as an important component of the total reaction of an individual to a test situation, it is conceivable that the effectiveness of a test device as a predictor of subsequent performance could be enhanced by taking the stress factor into account. Accordingly, the research examined the feasibility of manipulating level of stress as a means of increasing the predictive validity of a test device. It was expected that the correlation between pretest and final exam performance for the Ss receiving the pretest under stress-inducing (Stress) instructions would be higher than the correlation for the Ss receiving the pretest under non-stress-inducing (Relax) instructions. This expectation was predicated on the assumption that the engagement of stress responses

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in the two test situations for the Stress group, being deliberately aroused in the pretest situation and a natural component of the final exam situation, would enhance the consistency of the two performances, resulting in higher correlation.

Procedure

The Ss for the study were 254 education students enrolled in 13 sections of a graduate Foundations of Measurement course and 117 upper level education students enrolled in 7 sections of an undergraduate Introduction to Measurement course at the University of South Florida during the 1971-72 academic year. All graduate participants were taking measurement as a requirement; the undergraduate measurement course was an elective course.

The data were collected at the beginning of each of two academic quarters during 1971-72 academic year. The procedure was identical for both quarters. During the initial class meeting of each class section, all Ss were administered a 31-item computational test presented as a pretest. The test, developed by the investigators, was similar to the numerical ability subtest of the Differential Aptitude Test. A preliminary form yielded a KR-20 reliability estimate of .93. In the study half the pretest booklets contained Stress instructions and half contained Relax instructions. The differentially motivating instructions were patterned after those used by Nicholson (1958), I.G. Sarason & Palola (1960), & Hall (1969). The Stress instructions (Form S) presented to the respondent a situation of implied personal threat (e.g., the test "is designed to provide information about skills that are believed to be needed for reasonable success in this course"). The Relax instructions (Form R) informed the respondent that interest in his performance was for experimental purposes only, thereby allaying feeling of threat.

As a basis for checking the nature of the stress response aroused in the test situation, it was assumed that the two instructional conditions would register differently on a measure of state anxiety. Therefore, the A-state scale of the State-Trait Anxiety Inventory, Form X (Spielberger, Gorsuch, and Lushene, 1968) was placed at the end of the pretest to assess how the S felt while working on the task. As a measure of how the S feels at a particular point in time, the A-state scale operationalizes Spielberger's concept of state anxiety, i.e., anxiety as a transitory state.

After being introduced as a short "problem solving task" whose purpose would "become clear as we proceed," the two forms of the pretest package were randomly distributed to the students in each class by the instructor of that class. The students were then directed to read the instructions to themselves. Throughout the test session, the students indicated no awareness that they were working under different sets of instructions. Approximately half of the students (Group R) in each class took Form R of the pretest package and the remaining half of the students (Group S) took Form S. At the end of the term, each participating instructor administered a final examination in the area of "tests and measurements". To account for the lack of uniformity among instructors' examinations, each final examination score was converted into a standard score (non-normalized T) representing the individual's performance relative to the performance of his class section.

Data Analysis & Findings

Data on mean performance and variability of the pretest and final examination across treatments are presented separately for graduates and undergraduates in Tables 1 and 2, respectively. On the graduate level no

significant differences were found between the means of the Stress and Relax groups on either the pretest or final examination, nor were significant differences found between the standard deviations of the two treatment groups (See Table 1). The analyses were repeated for the undergraduate data with the same results (See Table 2).

Insert Table 1 about here

Insert Table 2 about here

To test the basic hypothesis on the graduate data a Pearson r was computed between the pretest scores and final exam standard scores for each treatment group and a test for a significant difference between the independent rs was carried out. The procedure was repeated on the undergraduate data. The results of these analyses are contained in Table 3. On the graduate data, the r obtained for Group S was .54 and the r obtained for Group R was .36. The difference between the r's was found by the appropriate z test (Wyatt & Bridges, 1966) to be significant ($p<.05$, one tail) in the predicted direction. On the undergraduate data, the r obtained for Group S was .37 and the r obtained for Group R was .07. The difference between these rs was also found to be significant ($p<.05$, one tail) in the predicted direction. All rs except the Relax r for undergraduates ($r = .07$) were significantly different from zero ($p<.01$).

Insert Table 3 about here

In an attempt to examine the nature of the stress responses elicited by the differentially motivating instructions, analyses were performed on the A-state data generated in the pretest situation. A-state means and standard deviations for the two instructional conditions are presented separately for graduates and undergraduates in Table 4. No significant difference was found between the A-state means of the Stress and Relax conditions on either the graduate data or undergraduate data.

Insert Table 4 about here

Conclusions & Discussion

On both the graduate and undergraduate data, support was demonstrated for the hypothesis that the correlation for Ss under Stress instruction would be larger than that for Ss under Relax instruction, indicating superior predictive power for the pretest administered under Stress conditions. The meaningfulness of these results is strengthened by the lack of significant differences in mean performance and variability across treatment groups on the pretest and posttest measures. Aside from the direct practical implications for the field of academic prediction, the results of the study buttress the view of test performance as a complex product of both cognitive and non-cognitive factors and encourages further study of specific non-cognitive factors as mediators of performance.

The results of the study suggest the usefulness of a Stress dimension for enhancing the predictibility of performance. Even so, the precise nature of the stress response produced in the study remains in question. The investigators had assumed that the stress condition would operate as

essentially an anxiety-inducing stimulus, thereby invoking a higher level of transitory anxiety as measured by the A-state scale. That assumption earned no empirical support.

The failure of the instructional conditions to register different levels of A-state may mean that differentially motivating instructions of the type used produce reactions of a type that cannot properly be considered anxiety reactions. On the other hand, the findings on A-state may be the result of an insensitivity of the A-state scale based on the manner in which it was used. The investigators lean toward the latter as a possible explanation of the outcome. As noted under "Procedure," the A-state data were gathered at the conclusion of the pretest situation and the pretest itself functioned as a relatively easy achievement task (see Table 1). Any anxiety response that may have existed at the beginning of the pretest could have dissipated by the conclusion of the task. If such were the case, the A-state results would reflect upon a design error within the procedural process. These unresolved questions regarding the nature of the stress response produced in the study suggest the need for a more careful study of differentially motivating instructions as a mechanism of threat arousal.

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Table 1

Means & Standard Deviations of Pretest Scores & Final Exam Standard Scores under Stress & Relax Conditions for Graduates

	Pretest		Final Exam	
	M	SD	M	SD
Stress (N=130)	25.41	5.69	50.19	9.71
Relax (N=124)	25.03	6.00	50.65	9.67

Table 2

Means & Standard Deviations of Pretest Scores & Final Exam Standard Scores under Stress & Relax Conditions for Undergraduates

	Pretest		Final Exam	
	M	SD	M	SD
Stress (N=59)	24.70	5.31	49.03	10.12
Relax (N=58)	25.48	4.81	48.26	10.38

Table 3

Correlations of Pretest Scores with Final Exam Standard Scores under Stress & Relax Conditions for Graduates & Undergraduates

	Graduate	Undergraduate
Stress	.54* (N=130)	.37* (N=59)
	a	a
Relax	.36* (N=124)	.07 (N=58)

*p<.01 (two tail)

[a]Difference between these two correlations significant (p<.05, one tail)

Table 4

A-state Means & Standard Deviations under Stress & Relax Conditions for Graduates & Undergraduates

	Graduate		Undergraduate	
	Stress (N=130)	Relax (N=124)	Stress (N=59)	Relax (N=58)
M	41.34	41.13	39.22	37.95
SD	11.46	11.81	10.83	10.52